FARM FACTS

Securing Low Erosion Risks after Growing Pulses and Oilseeds

Published by Saskatchewan Agriculture and Food

Producers have been diversifying their crop rotations with significant acreage planted to canola, mustard, field pea, lentil, and chickpea. Compared with traditional cereals, these crops greatly increase the risk of erosion because:

- Pulse and oilseed crops often produce less residue than cereals
- Pulse and canola residue is more easily disintegrated by tillage than cereal residue.
- On a pound for pound basis, pulse and oilseed residue is less effective for controlling erosion than cereal residue

Potential erosion problems with non-cereal crops are great in the Brown and Dark Brown soil zones because yields are often relatively low while strong winds are common. This fact sheet provides information on how to reduce the risk of erosion following pulse and oilseed crops.

Erosion Risk and Required Residue Amount

Erosion risk depends on the soil type and condition, field topography, eroding power of wind or water, and protection with residue. Acceptable erosion risk occurs when the topsoil lost from wind and water erosion is less than topsoil replacement by natural soil-building processes. To secure acceptable erosion risk, there is a minimum amount of remaining crop residue required for each soil type. Because of the nature of the residue, it takes more residue from canola, mustard, pea, lentil, or chickpea to provide equivalent protection compared to cereal residue. Table 1, below, shows the residue amounts required for different crop types to maintain a low risk of soil erosion. Figure 1 shows the average amount of flat residue produced for different grain yields. Figure 2 shows the impact of tillage on flat residue using sweeps at different speeds.

Figure 1. Flat Residue vs Grain Yield

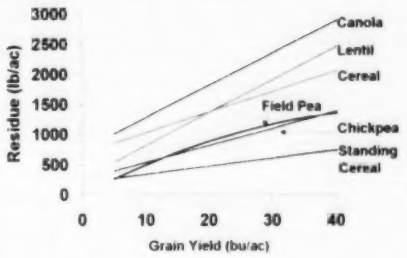

Figure 2. Non-cereal Residue for Sweep

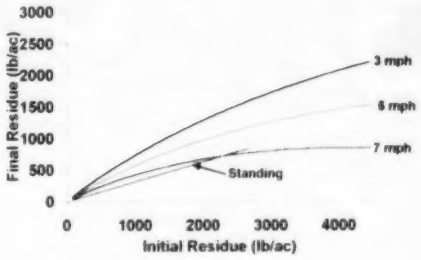

Table 1. Residue Required (lb/ac) for Different Crop Types to Maintain Low Erosion Risk

	Cereal			Canola/Mustard			Pulse		
	Both		Only	Both		Only	Both		Only
Soil Texture	Standing	Flat	Flat	Standing	Flat	Flat	Standing	Flat	Flat
Sandy Loam	120	980	1750	180	1150	2720	110	2520	3240
Loam	120	450	890	180	410	1428	110	1180	1620
Clay Loam to Clay	120	530	940	180	450	1490	110	1250	1700
Heavy Clay	120	630	1170	180	665	1820	110	1620	2120

- residue required to keep estimated rates of erosion to less than 2 ton/ac/yr at Swift Current, SK
- standing residue is anchored to the soil surface, amounts shown represent after one to two tillage passes
- flat residue is not anchored to the soil surface and has no vertical orientation

101-03945/

Residue Amounts and Erosion Risks in a Cropping System

Table 2 below gives estimates of the residue level remaining for varying crop sequences and tillage systems. Erosion risk after pulses and canola is often high if there is any high disturbance tillage to the stubble. Managing rotation and tillage to conserve cereal residue will greatly reduce the erosion risk.

General Rules for Reducing Erosion Risk After Pulses or Oilseeds

1. *Seed pulses and oilseeds on land that is less prone to erosion.* Avoid seeding pulses and oilseeds on fields that are prone to erosion such as sandy soils. If possible, choose fields with shelterbelts.
2. *Minimize or eliminate tillage!* Don't do any fall tillage after an oilseed or pulse crop. Low-disturbance direct seeding greatly reduces the erosion risk by increasing residue conservation. Low-disturbance direct seeding is strongly recommended if the amount of crop residue produced was low.
3. *Slow down!* For example, if seeding with sweeps, slowing down from 6 mile per hour to 5 miles per hour increases residue conservation by about 15%.
4. *Plan rotation and tillage to maximize carryover of crop residue from one year to the next.* Cereals provide more persistent residue and so are essential in rotation with pulses and oilseeds. Avoid fall tillage before an oilseed or pulse crop and, if possible, seed the pulse or oilseed crop using low-disturbance direct seeding. If seeding oilseeds or pulses on fallow, seed directly into chem fallow from a cereal crop rather than into tilled fallow.
5. *Avoid harvesting pulse straw for feed on land prone to erosion.* If harvesting pulse straw, do so only when there will be good residue cover remaining after baling and seed the crop next year using low-disturbance direct seeding.

For more information on securing a low erosion risk after pulses and oilseeds, including a downloadable spreadsheet to calculate erosion risks for specific field situations, check out this web site: **http://res2.agr.ca/swiftcurrent/soil/**

Prepared by: B. McConkey, AAFC Swift Current; Ken Panchuk, Saskatchewan Agriculture and Food. Reviewed by the Saskatchewan Advisory Sub-council on Soil and Crop Management.

Table 2. Management and Expected Residue Amounts (Swift Current, slopes < 5%)

Field Management Two Years Ago	Last Year's Crop (bu/ac)	Standing & Flat Residue (lb/ac) after Seeding This Year: Knife (low-disturbance direct seeding) Standing	Knife Flat	Sweep (high-disturbance direct seeding) Standing	Sweep Flat	Sweep/Harrow + Sweep (pre-seed cultivation + seeding with sweeps) Standing	Sweep/Harrow + Sweep Flat
Tilled Fallow	Pea (50)	152	755 [B]	*140*	*735* [C]	*27*	*399* [C]
	Lentil (25)	89	858 [A]	*73*	*812* [C]	*14*	*433* [C]
	Chickpea (30)	145	574 [B]	*132*	*588* [C]	*26*	*331* [C]
	Canola/Mustard (30)	**215**	**1231**	**224**	**1160**	*43*	*535* [C]
Cereal Stubble Worked Once Before Seeding	Pea (40)	167	956 [A]	158	882 [B]	*31*	*463* [C]
	Lentil (20)	108	961 [A]	91	885 [B]	*18*	*465* [C]
	Chickpea (25)	161	746 [A]	150	727 [B]	*29*	*396* [C]
	Canola/Mustard (20)	**227**	**1196**	**242**	**1039**	*47*	*527* [C]
Cereal Stubble, Direct Seeded with Low Disturbance	Pea (40)	**173**	**1174**	166	1025 [A]	*32*	*522* [C]
	Lentil (20)	**115**	**1178**	99	1028 [A]	*19*	*523* [C]
	Chickpea (25)	**167**	**963**	158	887 [B]	*31*	*465* [C]
	Canola/Mustard (20)	**231**	**1414**	**250**	**1166**	*49*	*575* [C]

Bold: Adequate residue for low erosion risk for all soil textures

[A] Residues inadequate to maintain low erosion risk on sandy loam soil textures

[B] Residues inadequate to maintain low erosion risk on heavy clay and sandy loam soil textures

[C] *Residues inadequate to maintain low erosion risk on any soil texture*

Funding support for this project was provided by the Canada-Saskatchewan Agri-Food Innovation Fund

Saskatchewan Agriculture and Food

Printed January 2001
2.5M ISSN 0840-9447 SUS 0016